Federal Democratic Republic of Ethiopia

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ET ISO 16293-1 (2008) (English): Glass in building -- Basic soda lime silicate glass products -- Part 1: Definitions and general physical and mechanical properties

ISO INSIDE

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ETHIOPIAN
STANDARD

First edition

(Identical with ISO 16293-1:2008)

ICS:81.040.20

Published by Ethiopian Standards Agency

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This Ethiopian Standard has been prepared under the direction of the Technical Committee for Ceramic,terracotta building materials and glass(TC 37) and published by the Ethiopian Standards Agency(ESA).

The standard is identical with ISO 16293-1:2008(E) Glass in building — Basic soda lime silicate glass products — Part 1: Definitions and general physical and mechanical properties published by International organization for standardization(ISO) .

For the purpose of this Ethiopian Standard , the adopted text shall be modified as follows.
- The phrase “International Standard” shall be read as “Ethiopian Standard”; and
- A full stop (.) shall substitute comma (,) as decimal marker.

Glass in building — Basic soda lime silicate glass products —

Part 1: Definitions and general physical and mechanical properties

1 Scope

This part of ISO 16293 defines and classifies basic soda-lime silicate glass products, indicates their chemical composition, their main physical and mechanical characteristics and defines their general quality criteria.

Specific dimensions and dimensional tolerances, description of faults, quality limits and designation for the product types are not included in this part of ISO 16293.

NOTE It is intended to include the specific dimensions and dimensional tolerances, description of faults, quality limits and designation for the product types in the future ISO 16293-2, which is specific to float glass.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
float glass
flat, transparent, clear or tinted soda-lime silicate glass having parallel and polished faces obtained by continuous casting and flotation on a metal bath

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4 Chemical composition

4.1 General

The basic glass products covered by this part of ISO 16293 are all manufactured from soda-lime silicate glass having a composition with the percent mass fraction of the major components within the following ranges:

— silicon dioxide (SiO_2)	69 % to 74 %;
— calcium oxide (CaO)	5 % to 14 %;
— sodium oxide (Na_2O)	10 % to 16 %;
— magnesium oxide (MgO)	0 % to 6 %;
— aluminium oxide (Al_2O_3)	0 % to 3 %;
— others	0 % to 5 %.

In addition to the above general composition, these glasses may also contain small quantities of other substances.

4.2 Tint

Body-tinted glass is obtained by the addition of suitable materials.

5 Physical and mechanical characteristics

5.1 General characteristics

Conventional numerical values for the physical and mechanical characteristics of basic glass products are given in Table 1. These values, for normal, annealed glass without any further toughening, are not precise requirements with which the glass shall strictly comply, but are the generally accepted figures for use in calculations where a high degree of accuracy is not required.

Table 1 — General characteristic values

Characteristic	Symbol	Numerical value and unit
Density (at 18 °C)	ρ	2 500 kg/m^3
Hardness		6 units (Mohs' scale)
Young's modulus (modulus of elasticity)	E	7×10^{10} Pa
Poisson's ratio		0,2
Specific heat capacity	c	$0,85 \times 10^3$ J/(kg · K) (at 50 °C)
Average coefficient of linear expansion between 20 °C and 300 °C	α	9×10^{-6} K^{-1}
Thermal conductivity	λ	1 W/(m · K)
Mean refractive index to visible radiation (380 nm to 780 nm)	n	1,5

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5.2 Designation of clear glass

5.2.1 General

A glass product is designated as clear glass when it is not tinted and when the light transmittance of the glass material, unmodified by the possible presence of a coating, complies with 5.2.2.

In order to measure the light transmittance characteristics of glass to determine whether it can be designated as a clear glass, it is necessary, in some cases, to carry out a pre-treatment to eliminate the coatings on smooth surfaces without significantly modifying the thickness of the glass substrate.

The light transmittance of the glass substrate shall be measured with its surfaces in a polished condition. Measurement shall be in accordance with ISO 9050.

NOTE The light transmittance values given in 5.2.2 are not suitable for design. They are values used only for the designation of clear glass and exclude the effects of coatings. It is necessary to obtain the values of light transmittance used for design from the glass manufacturer.

5.2.2 Clear transparent glass

A transparent glass product is designated as clear glass when it is not tinted and when its light transmittance, after any necessary pre-treatment and rounded to the nearest 0,01, is greater than or equal to the value given in Table 2 for the nominal thickness of the glass product.

NOTE The limiting value given in Table 2 is appropriate provided that the measured thickness of the glass product is within the allowable tolerances for the nominal thickness of that product.

Table 2 — Minimum light transmittance values for designating a transparent glass product as clear glass

Nominal thickness mm	**Minimum value of light transmittance**
2	0,89
3	0,88
4	0,87
5	0,86
6	0,85
8	0,83
10	0,81
12	0,79
15	0,76
19	0,72
25	0,67

5.3 Stability of physical and chemical characteristics

For basic glass products, the physical and chemical characteristics can be considered as remaining constant over time.

a) Since glass is insensitive to photochemical effects, the spectral properties (transmission of light and solar energy) of the basic glass products are not modified by direct or indirect solar radiation.

b) The surface of the glass used in building is virtually insensitive to attack from the environment.

6 General quality criteria and their evaluation

6.1 Optical quality

This criterion concerns the visibility of objects observed through the glass and only applies to transparent glass products.

The main faults that can affect the optical quality are distortion of the surface and lack of homogeneity in the body of the glass.

The optical quality shall be evaluated by means of a visual observation method.

6.2 Appearance

This criterion concerns the appearance of the product.

The visual quality can be affected by the presence of spot faults (bubbles, stones, etc.), linear/extended faults (scuff marks, scratches, lines, deposits, impressions, etc.).

Spot faults are evaluated by specifying numbers and dimensions.

Linear/extended faults are evaluated by visual observation.

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Ethiopian Standards Agency

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010.ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1970.

ESA's objectives are:-

- Develop Ethiopian standards and establish a system that enable to check weather goods and services are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational Institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.
Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement
ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM).It is a founding member of the African Regional Organization for standardization (ARSO).

More Information?
Contact us at the following address.
The Head Office of ESA is at Addis Ababa.

☎ 011- 646 06 85, 011- 646 05 65
📠 011-646 08 80
✉ 2310 Addis Ababa, Ethiopia
E-mail: info@ethiostandards.org,
Website: www.ethiostandards.org

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